Non-Isothermal multiphase flow in a fractured reservoir during CO_2 storage

Bezos, Víctor. Carrera, Jesús. Hidalgo, Juan J.

During CO_2 storage, multiphase flow takes place in the reservoir due to the presence of a wetting phase (brine) and a non-wetting phase (CO_2). Also, we could assume that fluids are components in a certain phase (compositional formulation). Hence, non-isothermal multiphase flow in the porous media is commonly modeled solving the mass phases (or component) and energy balance equations.

Moreover, due to the nature of the porous media, we have to consider some processes that include non-linearity into our mass phase balance equations, weak in case of the thermodynamics of the CO_2, or stronger such as the case of the retention curve. These non linearities grow with the increase of the medium heterogeneity.

This work is focus on the study of the multiphase flow in a fractured reservoir, by looking especially the mobility of each phase in the matrix and in the fractures.

For this purpose, we are developing c++ code to carry out simulations and later, we will compare model results obtained with the result from the current pilot project development at Hontomín (Spain) within TRUST (EU project).